



Management Approaches to Hyperacusis in Children

Framework of Symptom Management

Hyperacusis is a subjective condition and cannot be measured or recorded any more than one can objectively verify headache or tinnitus. Hyperacusis in children is recognised by the way sound exposure is associated with atypical behaviour patterns. Information is needed on the way over-sensitivity to sound is affecting the life of the child and his/her family. This can be derived through careful discussion with the family and other carers. The aim is to identify the three different factors relating to the unusual or extreme reactions to sounds. These are a) the types of sounds, b) the behaviours observed c) coping mechanisms that can help. Then the appropriate management strategies can be developed around the needs of the child and family along the steps given below. Not every child will need all levels of intervention. Often an explanation of the hyperacusis and the associated behaviours, will indicate how the environment, types of sound and the child's responses can be managed, to reduce the impact of specific noise sources. There are six component parts to hyperacusis management.

1. Profile of hyperacusis in the child's everyday life
2. Impact of problem on individual / family / others
3. Understanding of condition by all carers leading to consistency in management.
4. Behavioural desensitisation
5. Auditory desensitisation
6. Follow-up regime

1. Profile of the Hyperacusis on the Individual

On the basis of information given in the case-history, one can build up a picture of the impact of hyperacusis on the child. A list of the different sounds that are aversive should be made, starting with the most aversive sounds and the situations these occur in. (The inability to tolerate a particular sound is not due to the intensity level of the sound. It relates to some other aspect of the sound. Children with extreme hyperacusis can be very noisy themselves with other types of sounds.) The profile should clearly define the behaviours that observed on exposure to specified sounds and the contexts in which these occur (covers ears, lashes out, falls to floor, cries etc).

2. Impact of the Hyperacusis on Family and School Life

Diary sheets can be used to give a profile of aversion behaviours associated with different sounds and places. Usually I would give one sheet to be filled in over a typical week, including the weekend and home and school hours, so that a record can be kept of the details of sound-related incidents. These can be helpful in recording specific contexts and times in which hyperacusis occurs, and help carers recognise behaviours associated with sound conditions. The diary should not be kept for longer than a week as it may become a negative focus of attention. It is helpful to get a rating

on a 0-10 scale of the impact of hyperacusis behaviours on family life by the parent and perhaps at school, by the teacher.

Wider discussion also allows different carers to become aware of behaviours occurring in situations which may not have been noticed before and translates descriptions like "he doesn't like sounds" to a more objective behavioural account of the problem (eg. runs away, attacks another child, cries and covers ears). Through this information it should be possible to draw up a hierarchy of sounds that are intolerable to the individual.

3. Understanding of Hyperacusis by all Carers

Reduction in the fear of sounds is very important, as anxiety provoked auditory sensitivity can sustain hyperacusis, even when the physical pain and discomfort caused by a sound may be reducing. However it is crucial that the physical pain experienced on exposure to sound is acknowledged and managed in parallel to the behavioural modification undertaken by the clinician (typically a psychologist).

There have been some situations where the assumption has been made that hyperacusis is primarily a noise *phobia*. This can cause inappropriate techniques to be used, which would be the equivalent of repeatedly burning someone to reduce fear of fire. There is no doubt that people with hyperacusis can and do develop anxiety about situations in which they may be exposed to noise and that this, in turn, increases their sensory sensitivity. However if someone was burnt every time they went into the kitchen, it would be appropriate for them to develop fear and avoidance of that situation.

It is not easy to empathise with the notion of physical pain caused by exposure to sound, but this is exactly what adults with hyperacusis and no learning disability, or psychiatric histories describe happening. They also describe the frustration of trying to convince sceptical professionals of the reality of their symptoms.

4. Management of the hyperacusis with a hierarchy of three possible levels of intervention.

Level One

Information about hyperacusis

It is very important that all the carers of the child are consistent in their management of the child when aversive sounds occur. Many parents will be relieved to know that hyperacusis is a recognised condition, both in adults and children, and that it is not a figment of their imagination, or their child using attention-gaining behaviours. They may feel empowered to develop their own coping and informal desensitisation strategies for use at home if there are very specific causes of aversion behaviours. It is important to give both verbal and printed information to parents for them to discuss with teachers and other relevant carers. If the hyperacusis is not impacting on family/school life on a regular basis, or causing avoidance of particular situations, information giving and discussion of management strategies may be sufficient intervention. It is important to give a follow-up appointment, or telephone contact, so that if the symptom profile does not improve another approach can be utilised.

Level Two

Behavioural Desensitisation of Anxiety about Sound Exposure

Hyperacusic adults, without any learning disabilities, describe hearing noise as feeling like "knives through the ears or head", extreme pain or a "grating of the nerves". They may have a panic response, with possible outbursts of aggression, tears or escape strategies. They further describe the isolating nature of the condition, and the impossibility of getting others to understand what it is they experience leading to withdrawal and depression. How much more difficult must it be for a child with limited communication skills? Inevitably there is likely to be a learned association of fear and anxiety when in situations where uncontrolled sound exposure may occur.

In order to break down the learned association of anxiety with noise exposure, a desensitisation programme may be appropriate, though the physical occurrence of pain with noise exposure should be acknowledged, even though the condition may be maintained by anxiety. Assume that any noise which is seen to be aversive to the child, is also uncomfortable, and work to break down the fear association. A clinical psychologist will develop a programme of behavioural desensitisation, but the following suggestions can be used by everyone.

1. When the child becomes distressed by exposure to sound, move the child away from the sound source if possible and then **comfort** and **reassure** him/her.
2. Try to **explain** the **source** of the sound to the child.
3. The child's fear reaction will often diminish if s/he can exercise some **control** over the sounds. So encourage the child to clap his own hands, to play with noise makers or to start and stop the vacuum cleaner at home. There is a specific therapy programme which is based on the child producing a range of different sounds in a play situation. This may involve tapping a table top in a certain rhythm or shaking rattles but the child is always in control of the sounds.
4. **Repeated gentle exposure** to the noise may help the child to reduce anxiety and desensitise the auditory aspect of the sensitivity. You could tape-record one or more of the problem sounds (eg laughter, clapping, thunder, sirens, machine-noise) and help him to switch the tape recorder to a very low volume. Gradually over a period of days or weeks the volume can be increased. Practice with the sounds under play conditions that the child can control, to help break the association of that sound with fear. This is not the same as unexpected exposure to the same sound, as people with hyperacusis do say that they can often cope better if they are warned that a sound is about occur, but it is helpful.
5. Children should **not be forced to stay** in a situation that is causing them obvious distress (for example during singing in assembly). This may compound their apprehension and make them associate that situation (eg. the assembly hall) with pain. If fear of a specific situation has become established, it is important to gradually desensitise the child, with time and care.

6. Older children may be reassured if they are told they have **the teacher's permission to leave** the classroom for a few minutes at any point if they are exposed to an aversive noise. In our experience children do not abuse such an arrangement but are greatly reassured to know that they can leave a room, for a short time, if noise becomes distressing to them.
7. The use of ear plugs, muffs or defenders should be **avoided** except in extreme or short-term, unavoidable situations (eg during a journey). Exposure to normal and tolerable sound is crucial if the ear and brain are to establish normal sensitivity.

Auditory Desensitisation.

Auditory desensitisation aims to reduce the over-sensitivity of the hearing system to the sounds that the child finds uncomfortable. If this is a very specific sound source, eg the sound of material being rubbed, it may be easy to design a hierarchy of acceptable noises, through more challenging sounds, and building up to more aversive ones. The important aspect is to keep the signal carefully graded to be acceptable, and under the control of the listener. A tape recording of sounds played by the child at their own comfortable level may be helpful. This approach may be undertaken by the family, without requiring professional support. However if there is a wide range of sound sources and situations a more proactive approach is needed.

Level Three

Using Noise Generators to reduce auditory over-sensitivity

Noise generators (which are also tinnitus maskers and look like hearing aids) can be used to reduce the sensitivity of hearing for people with hyperacusis. A noise generator produces a steady, wide-band noise. It has a volume control to allow the noise level to be turned up or down. This is an established method of helping hearing over-sensitivity in adults in Audiology departments in the UK. The application of this technique to children, particularly those with learning disabilities, requires time and support, but has been found to be very effective, even for children with limited communication skills. There should be someone in the local audiology department who is able to advise you on the availability of this technique.

It would be recommended that an incident diary is completed at home and school for a full week prior to starting use of maskers, to give a base-line of hyperacusis profile and behaviours. This allows outcome measures to be kept for the intervention and to build support for funding requests for maskers.

The aim of using noise -generators is to improve a person's ability to tolerate normal exposure to sound, by reducing the sensitivity of the ear. The precise way that this occurs is not understood. The addition of a masking noise to hearing of everyday sounds gives an immediate improvement, presumably by reducing the harshness of individual sound signals. However there is a longer-term benefit that is seen when the maskers are not in use in that there is a gradual improvement in the tolerance of sounds, which suggests some sort of control on the over-excitability in the hearing system. Whether this is to do with changing the excitation patterns in the auditory system, or whether it gives people more control

over their anxiety (or both), is not yet clear. Most adults report that over about one year to eighteen months of noise-generator use, their hearing sensitivity is much more normal.

The most effective management of hyperacusis is to use noise-generators in parallel to a programme aiming to reduce fear and anxiety associated with sound exposure. It is not aiming to mask out or reduce the level at which the person can hear the sounds causing discomfort. This technique requires long-term, low level, noise exposure while maintaining normal access to everyday environmental and speech information. There is no possibility of damage to the hearing mechanism through use of sound generators.

Fitting the Devices

Noise generators are worn behind the ear in a similar way to post-aural hearing aids. The sound is fed into the ears through an open ear mould, which is designed so that it does not block the ear canal, as this would result in loss of some background sounds. Although there are noise generators which go into the ear canal, they are not appropriate for hyperacusis desensitisation as they reduce access to normal sound. (The use of ear plugs and muffs for extended periods of time is also counter-productive). The ear mould and device must be comfortable and secure so that it is realistic to build up the daily hours of use. As hearing sensitivity usually occurs in both ears, binaural fittings need to be made. Occasionally the hyperacusis is reported from one ear in which case only that side needs to be fitted.

Setting the initial output level

The device has a volume control to change the intensity level of the sound that it gives out. This should be set at the beginning of the session or day in a quiet situation when the subject is calm and relaxed. The subject may be able to say, or indicate, when the sound is just perceptible to him / her. It may be necessary to allow some practice so that a reliable technique can be established, because if the child is asked "Can you hear that?" they are very likely to answer "yes" regardless of whether they can or not. If a child is not able to communicate detection of the sound, maskers should be fitted at the just-audible output for another normally hearing person.

It is important that the device can only just be heard initially. The sound should not be intrusive in daily activity. If the background level of sound increases in any situation, the noise generator output should be kept at the initial setting even if the wearer can no longer hear it. Only if the environmental noise level is uncomfortable should the device output be increased to cope with the discomfort.

Duration of Use

The aim is to build up the time that the device is worn to at least six hours a day. This will usually be in the home in quiet situations, but will gradually include other environments such as in school and while travelling. As the wearer becomes used to the devices, it may be helpful to keep a short-term diary of times of use and any

perceived effects. This is not to raise the profile of the hearing sensitivity, but to keep a note of changes in behaviour or reaction to sounds while the noise-generators are being used.

Increasing the output level over time

When the child has been using the maskers quite comfortably for six hours per day without any problems, the level of the noise output should be fractionally increased. The new level should not be challenging to the wearer, but they may need time to acclimatise to the new level. Again, if there are still specific situations, or sounds that the child cannot tolerate with the maskers at this output level, the level should be minimally increased again. This gradual increase in output should be used to improve the child's ability to tolerate different environments of everyday life. Once a child is able to comfortably go in all typical situations throughout the day, and cope with all the different sound sources around him, there is no need to increase the masker noise level further.

Some children very quickly get the hang of changing the masker output volume themselves depending on the environment they are in. This is fine and can be encouraged and supported. They may choose to have a different masker level in each ear. As hyperacusis is a subjective condition, this is very helpful.

There is no set output level that the wearer must reach, but when he can tolerate all the different noise situations that he typically goes in, with noise generators on, there is no need to continue to increase the volume of the masker. In practice, with the majority of children who have been fitted to date, there has been immediate acceptance of the maskers, and the children have very quickly got used to volume changes, sometimes even turning them up and down as necessary in different listening conditions.

Repeat Diary of Hyperacusis incidents

After about two months of use it is helpful to repeat the incident diary for a full seven day week, recording all noise-associated behaviours, as done at the outset of the masker use.

When does one start to reduce the masker use, or noise level?

You may find that there are situations that they can now happily tolerate without their maskers in and that the auditory over-sensitivity is improving. Don't over-challenge the child with situations that they are nervous about, without the maskers in, until they are ready to do so. Some children have just suddenly decided not to wear the maskers anymore, having worn them happily and to great benefit for many months. Unless there are situations which still have to be avoided because of hyperacusis, I would accept the child's improved auditory sensitivity, though you may chose to keep the maskers for use in new or more challenging situations. When the child can cope with all circumstances without their maskers, clearly the process has reset the "volume control" in the brain.

How long will it take?

The use of noise generators with hyperacusis in adults may typically go on for 12 to 18 months. After this period, most people find a long-term improvement has occurred in their sensitivity without the noise generators. Although we cannot predict how long this may take in children (and those with a learning disability) the desensitisation should still be carried out over a finite period of time. As it seems that auditory over-sensitivity is increased with generalised stress and anxiety, it is important that anxiety issues are addressed in parallel to this process.

Complete a third incident diary to check that there are no residual behaviours that can be identified. As the impact of hyperacusis is much less now, there is a tendency for people to be reluctant to fill in the form consistently at this stage. It is very important that this is done, as it builds evidence for the value of the intervention (or not) and will underpin the availability of resources for other children to be helped.

Many families and children keep their maskers in case of use for a new activity (for example attending a film, or football match).

Josephine Marriage PhD
Clinical Scientist (Audiology)

If you have any comments or feedback on the information in this document, please email them to me on josephine@chears.co.uk
Threelevels/hypman/Jan09